REMARKS

Claims 1-11 are all the claims pending in the application.

As a preliminary matter, Applicant thanks the Examiner for acknowledging Applicant's claim to foreign priority and receipt of the priority documents.

Claims 1-10 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 1-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Coldren (U.S. Patent No. 6,349,106) ("Coldren") in view of Adair et al. (U.S. Patent No. 6,490,381) ("Adair"). Applicant submits amended claims 1-3 to overcome the Examiner's rejections under § 112, second paragraph.

In response to the Examiner's statement that claim 1 is written in terms of narrative, Applicant has amended claim 1 in non-narrative form. Applicant has amended claim 1 to include additional language reciting structure and structural relationship among the elements to support a wavelength tunable laser. As for the Examiner's characterization of the reflective peak of an integer N of optical frequencies as being ambiguous, Applicant submits that claim 1 now recites "selectively reflected frequencies," which the Applicant believes to be unambiguous. Applicant has also amended the claim to recite only one laser.

In regard to the Examiner's assertion that the claim fails to provide any means to support an effective group index and the means for adjusting and operating function, Applicant submits that it is well known in the art that the effective group index refers to the effective group index of an active layer in semiconductor lasers and that the change in the effective group index of an active layer is approximately proportional to the change of the real part of the refractive index in the active layer. Additionally, Applicant submits that an "effective group index that can be

adjusted electro-optically as a function of an electrical voltage applied" is clear to one skilled in the art in disclosing how the effective group index is adjusted.

Further, Applicant has amended claim 1 to include a recitation of the second active section providing for a selective coincidence of one optical frequency. Applicant believes that such a recitation traverses the Examiner's position questioning the credibility of the difference between the optical frequencies of any two resonant modes never being equal to the difference between the optical frequencies of any two reflectivity peak of the reflector.

In regard to the prior art rejection, Applicant submits the arguments below in traversal of the § 103(a) rejections.

Applicant's invention relates to a wavelength-tunable laser. The laser comprises a resonant semiconductor cavity coupled to a reflector which selectively reflects N optical frequencies. The resonant semiconductor cavity includes a phase tuning section which shifts the set of resonant frequencies of the resonant semiconductor cavity, i.e., slips the comb of resonant frequencies. In an embodiment, the reflector is a sampled Bragg reflector grating which selectively reflects N optical frequencies, i.e., the grating has reflectivity peaks for N optical frequencies. The optical length of the resonant semiconductor cavity, and hence, the comb of resonant frequencies, is adjusted as a function of a control voltage on the phase tuning section to provide for the coincidence of one optical frequency between the resonant semiconductor cavity and the reflector. The invention permits a laser to be tuned quickly over a wide band.

Coldren relates to wavelength converters in which an incoming lightwave of one wavelength is converted to another wavelength. To achieve this result, Coldren discloses a photodetector element, a current conditioning element, and a multisection tunable laser element

including a tunable laser section 12. The laser 12 is disclosed to use SGDBRs (i.e., Bragg reflectors) 18 and 19, gain, and a phase-shift section to provide for output wavelength tunability (col. 8, line 66 - col. 9, line 5).

Adair relates to a solid-state optical switch using a Fabry-Perot type structure. The optical properties of the spacer material between reflectors of the Fabry-Perot structure are controlled to change the switch from an essentially reflective state to an essentially transmissive state, according to a control signal.

In rejecting claim 1, the Examiner states that Coldren does not disclose the active section connected to its own electrical supply, but that Adair discloses an active section connected to a control signal. As a result, the Examiner states that it would have been obvious to provide Coldren with the control signal connected to an active region as taught or suggested by Adair. Applicant submits that the Examiner incorrect.

Claim 1 recites in a combination with other elements, first and second active sections having dimensions such that the difference between the optical frequencies of any two resonant modes of a first resonant cavity is never equal to the difference between the optical frequencies of any two selectively reflected frequencies of a reflector. Unlike what is recited in claim 1, the combination of Coldren and Adair fail to disclose first and second active sections as recited in the claim. Although Coldren and Adair disclose the use of reflectors, namely, sampled-grating distributed-Bragg-reflectors or SGDBRs, the combination of the references fail to teach or suggest optical frequencies reflected from SGDBRs having the relationship with the resonant modes of a first resonant cavity, as recited in claim 1.

Further, claim 1 recites a second active section modifying an optical length of first resonant cavity to provide for a selective coincidence of only one optical frequency between the resonant modes of said first resonant cavity and the selectively reflected frequencies of said reflector. Nowhere in the combination of Coldren and Adair is there any mention or suggestion of such a selective coincidence of one optical frequency as recited in claim 1. Coldren summarily discloses that SGDBR 18 and 19 and gain 28 and phase-shift sections provide for output wavelength tunability over a range of several tens of nanometers (col. 8, lines 66 - col. 9, line 1). No addition disclosure on the interaction between the resonant modes of gain 28 and phase-shift sections, and the reflected frequencies of the SGDBR 18 and 19 is provided. Although Aldair discloses that the dimensions and materials of the Fabry-Perot structure are selected to preferentially transmit one or more of the optical signals (col. 9, lines 36-38), no disclosure is made regarding the coincidence of one optical frequency between a resonant mode and a set of reflected frequencies as recited in claim 1.

Additionally, the mere fact that Coldren may be combined with Adair to provide Coldren with the control signal connected to an active region as suggested by the Examiner does not make the modification obvious because Coldren and Adair both fail to suggest any motivation for, or desirability of, the changes espoused by the Examiner. Coldren and Adair are directed to devices for entirely different purposes. While Coldren is directed to an invention to <u>convert the wavelength</u> of an incoming lightwave, Adair is directed to an optical switch wherein a control signal predominately alters the imaginary component of the refractive index k to subsequently <u>alter the transmissive or reflective property</u> of the active layer, <u>not</u> the real component of the refractive index n to change the optical length. In fact, Adair <u>teaches away</u> from the use of an

external stimulus to change the real component of the refractive index n in optical switching applications (col. 3, lines 4-13):

> [a] problem with these devices in switching applications is that they will sweep across other wavelengths and disrupt communications in those channels. In fact, most devices that modulate the index cannot stay in the same channel passband while changing state.

In effect, the Examiner has relied on improper hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.[1]

Claims 2-10, which depend from claim 1, are believe to be patentable for at least the reasons discussed above for claim 1.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

[1] *See In re* Fitch, 972 F.2d 1260, 23 U.S.P.Q.2d (BNA) at 1783-84 (Fed. Cir. 1992) (*quoting In re* Fine, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d (BNA) 1596, 1600 (Fed. Cir. 1988)).

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